

STRENGTH AND DUCTILITY OF NANOSTRUCTURED SPD METALS

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Bulk nanostructured metals with a mean grain size of about 50 - 100 nm very often demonstrate high hardness but poor ductility, and it is still quite unclear whether this is associated with methods of nanostructured samples fabrication or specific deformation mechanisms.

This paper shows that very high strength and quite high ductility can be observed in nanostructured metals produced by severe plastic deformation (SPD). However, the combination of high strength and ductility is originated not only from the presence of fine grains, but a structure of grain boundaries and internal stresses, as well as disperse precipitations of second phases. The origin of this phenomenon is considered and discussed in this work based on analysis of performed mechanical tests and thorough microstructural studies. High strength and ductility are of great engineering importance, in particular for tailoring high fatigue properties and fracture toughness.